Knowledge Application Generates Transformation

Badhrulhisham Bin Abdul Aziz
Universiti Malaysia Pahang

SCOPE

1. Background
2. Knowledge vs Application of Knowledge
3. Transformation
4. Implementation via Engineering Technology
5. Initiative at MTUN and UMP
6. Wayforward
APPLIED KNOWLEDGE

"Knowledge isn’t power until it is applied."

~ Dale Carnegie

APPLIED KNOWLEDGE

“Knowledge is only useful if you do something with it.”

Jeffrey Pfeffer
Professor, Stanford Graduate School of Business
What makes the differences?

American
Announced to the world of a new invention!

Russian
Claimed it was discovered by them 20 years ago!

Japanese
Started to produce and sell!

POWER OF APPLIED KNOWLEDGE

With 0% basic R&D + 0% Product/Theory → Solve Industrial Problem Through Applied R&D

KAO Industry
1 month To automate manual process

KYOTO UNIVERSITY
Relevance extensive literature search
1 month Hire Lecturers & MSc Students

Seminar
2 month Data (Validate, Simulation)

Implementation (real world)
2 month
KNOWLEDGE GAP:
APPLICATION TO COMMERCIAL

Lab scale Simulation → Pilot plant scale Engineering design → Commercial scale

POWER OF APPLIED KNOWLEDGE

Fundamental Knowledge in Natural Rubber & Carbon Black

Batch (Branbury) → Continuous (Jet Mixer)

CB (Powder) RUBBER (solid) → 'wet crumbs'

CB (Blurry) RUBBER (liquid)
VISION 2020
NEW ECONOMIC MODEL

ROAD TO 2020
Malaysia’s has introduced 4 pillars to achieve Vision 2020

1Malaysia
People First, Performance Now
April 2009

Government Transformation Programme (GTP)
6 NKRAs
January 2010

Economic Transformation Programme (ETP)
SRIs & NKEAs
Q4 2010

10th Malaysia Plan
Macroeconomic growth targets & expenditure allocation
June 2010

New Economic Model - A high income, inclusive and sustainable nation
Smooth implementation of government’s development programme
The Goals

**New Economy Model**

- **HIGH INCOME**
  - Targets US$15,000-20,000 per capita by 2020

- **SUSTAINABILITY**
  - Meets present needs without compromising future generations

- **INCLUSIVENESS**
  - Enables all communities to fully benefit from the wealth of the Country

**CHARACTERISTICS IN 2020**
- MARKET LED
- WELL-GOVERNED
- REGIONALLY INTEGRATED
- ENTREPRENURIAL
- INNOVATIVE

**VISION 2020**

- **Malaysia**
  - People First, Performance Now
  - Preservation and enhancement of unity in diversity

- **ECONOMIC TRANSFORMATION PROGRAMME**
  - High Income
  - Inclusiveness
  - Sustainability

- **6 NKRA**
  - Effective delivery of government services
  - Reducing Crime
  - Fighting Corruption
  - Improving Student Outcomes
  - Raising Standards of Low Income Households
  - Improving Rural Basic Infrastructure
  - Improving Urban Public Transport

**Source:** Academia-Industry Consultative Council 8th Dec 2011
ETP focuses on:
- 12 National Key Economy Areas (NKEAs)
- 131 entry point projects
- 3.3 millions new jobs by 2020
- 60% are middle & high income jobs

ETP 1 year progress:
- 66% or RM10 billion worth of projects have started
- 53% of 131 entry point projects have taken off
- Private investments increased 23.4% to RM512.2 billion from RM41.5 billion

Source: Academia-Industry Consultative Council 8th Dec 2011
The Process

COHERENT ‘BIG PUSH’ TO BOOST TRANSFORMATION AND GROWTH

ENABLERS

Break logjam of vested interests through political will and leadership

Prepare people for change

STRATEGIC REFORM INITIATIVES (SRIs)

1. Re-energising the private sector
2. Developing quality workforce, reducing dependence on foreign labour
3. Creating a competitive domestic economy
4. Strengthening the public sector
5. Transparent and market friendly affirmative action
6. Building the knowledge base infrastructure
7. Enhancing the source of growth
8. Ensuring sustainability of growth

OUTCOME

High income

Inclusiveness

Sustainability

implementation, implementation, implementation ...

Its not about strategy, it is about implementation. We will work at “3ft level” to drive the NKEAs
We cannot continue at the current pace unless we transform…

What does all these mean to us?
TEVT is critical in the 10th Malaysia Plan

Policy guidelines from the 10th Malaysia Plan

Target

Improving the Perception of TVET and Attracting More Trainees
- A national media campaign will be developed and rolled-out...
- 69 out of 88 technical schools will be converted into vocational schools ...

Upgrading and Harmonising TVET Curriculum Quality in Line with Industry Requirements
- Standardize TVET curriculum ...
- Recognizing and equating various levels of Malaysian Skills Certificate with certifications issued by TVET providers
- A Board of Technologists Malaysia will be established
- Malaysia-Japan International Institute of Technology will be established as an independent institute

Developing Highly Effective Instructors
- Highly experienced industry personnel...to become instructors...
- Part-time working arrangements will be expanded...
- Centre for Instructor and Advanced Skills Training (CIAS) will be expanded...
- A new centre for instructor skills training will be developed to add a further training capacity of 80 instructors each year

Streamlining Delivery of TVET
- The current funding approach of TVET will be reviewed...provide financial assistance to students to study at Malaysian Skills Certificate Level 3
- The performance rating of TVET institutions will be utilized when making decisions for buying places...in private TVET institutions
- A total of RM 150 million will be set aside to train 20,000 school dropouts during the Plan period

On the supply side, there is also a significant pool of students for expansion of TVET

<table>
<thead>
<tr>
<th>Segment</th>
<th>Size Today</th>
<th>Segment description</th>
<th>Projected capture rate in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic education dropouts</td>
<td>30</td>
<td>Basic education dropouts, i.e. students leaving school prior to taking SPM</td>
<td>50%</td>
</tr>
<tr>
<td>SPM leavers directly entering workforce</td>
<td>100</td>
<td>Unskilled workers entering workforce without further qualifications, out of which 40k have no SPM credits</td>
<td>30%</td>
</tr>
<tr>
<td>Foreign students</td>
<td>0.2</td>
<td>Foreign students coming to Malaysia for Skills Training</td>
<td>16,000</td>
</tr>
<tr>
<td>Lifelong learning for unskilled and semi-skilled workforce</td>
<td>8,400</td>
<td>Upskilling of those already in workforce</td>
<td>20%</td>
</tr>
<tr>
<td>Higher level SKM 3 and 4</td>
<td>40</td>
<td>SKM 1 and 2 holders who do not currently go on to pursue SKM 3 and 4</td>
<td>50%</td>
</tr>
</tbody>
</table>

1 Skilled workforce defined as those with at least SKM 3 certificate, diploma, or degree certification. Semi-skilled defined as those with at least SKM 1 or 2 certification, while unskilled workers have only SPM certification. A 40% target is projected by Ministry of Human Resource, and a 50% target committed to in the 10th Malaysia Plan. 2 Target based on MOHR estimates, different from 10th Malaysia Plan published targets of 50%.
FACTS AND FIGURES

40,000 skilled workers needed by 2015 in oil and gas [KSM 2013];

RM 3.7 billion budget 2013 technical and vocational [KPM];

Australia ~ AUD 2 billion annually to provide skilled workers;
**FACTS AND FIGURES**

<table>
<thead>
<tr>
<th>Information</th>
<th>Details</th>
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<tbody>
<tr>
<td>40% or 1.3 millions skilled worker needed by 2020 for Malaysia to be high income nation.</td>
<td></td>
</tr>
<tr>
<td>In Malaysia, 10% joined vocational and technical after high school whereas in German, Finland and Austria 50 – 80%.</td>
<td></td>
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<tr>
<td>By 2020, 1.3 million workers TVET; ~ 700,000 diploma holders from polytechnic and other institutions</td>
<td></td>
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**FACTS AND FIGURES**

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<th>Details</th>
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<td>33% skilled workers in industrial sector by 2015 [KSU KKR]</td>
<td></td>
</tr>
<tr>
<td>11 industry sectors NKEA</td>
<td></td>
</tr>
<tr>
<td>SCORE (Sarawak) : by 2030 requires 435,000 manpower; 52.2% skilled and semi-skilled; 70,000 engineering-related</td>
<td></td>
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</tbody>
</table>
3.3 millions NEW JOBS

The Establishment of Malaysia Board of Technologists (MBOT)
Policy decisions on the establishment of MBOT

10th Malaysia Plan
 accelerates the recognition of TEVT certifications through the establishment of MBOT

Cabinet Committee on HCD (JKMPMI) No.3/2010 (20 August 2010)
 recommends the establishment of MBOT to recognise and certify technologist as a profession to increase the pool of skilled workforce required to attain a high income economy

Cabinet Decision (29 September 2010)
 endorses the decision of Cabinet Committee on HCD to establish MBOT

Cabinet Committee on HCD (JKMPMI) No.1/2011 (8 March 2011)
 expedites the establishment of MBOT to recognise TEVT graduates

Ministry of Science, Technology and Innovation

RATIONALE FOR MBOT

To elevate the standing and recognition of Technologists and Technicians
- Technologists and technicians are currently not recognised and certified as professionals by any professional body
- Technologists and technicians will be accorded international recognition through membership of MBOT in various international accords
- Institutions will be motivated to offer technology and TEVT programmes

To increase the pool of skilled workforce required to attain a high income economy
- Only 28% of the total workforce is employed in the higher skilled jobs category reflecting a huge pool of unskilled workforce
- Potential pool of 100,000 students (22% of total students enter the workforce after SPM) who are technically inclined
- Of the total 3.3 million jobs to be created under ETP by 2020, 700,000 jobs require skilled workforce with diploma in TEVT

To improve public perception of TEVT and attract more students
- On average, 10% of students enroll in TEVT institutions annually (low compared to 44% in OECD countries) reflecting the unattractiveness of TEVT
- 38 diploma / advanced diploma engineering and technology courses offered by 30 polytechnics will be accredited
- 30% of the 5,639 skills programmes that are technical-based will be accredited
- More students will be motivated to enroll in TEVT

To protect public safety and health through...
- Quality assurance (qualification, accreditation, training)
- License professional technologists / certified technicians to offer professional technology and technical services
- Regulate code of conduct and ethics of technologists and technicians
A person who applies knowledge of mathematics, science and technology specialisation to defined and applied procedures, processes, systems or methodologies.

Source: Adapted from International Engineering Alliance, Version 2-18 June 2009

A person in a field of technology who is proficient in the relevant skills and techniques, with a relatively practical understanding of the theoretical principles.

Source: US Department of Labor Job Description

Services provided by professional technologist in connection with product development, manufacturing, operation, product testing and commissioning, maintenance and any other areas approved by the Board.

Ministry of Science, Technology and Innovation

In order to distinguish between engineering and engineering technology, a technological spectrum is used to illustrate the differences. Generally, in an organization, engineers would most likely work in the design and development fields while technologists, technicians and craftsmen would be more inclined to work in manufacturing and production line. The engineers role are more towards the left of the spectrum while the technologists are more towards the right of the spectrum although the main activities of both engineers and technologist are in the center of the spectrum.

Source: Cheshier, 1998
**ENGINEERS**

- A **engineer** is a **problem solver**. They take basic science information and use the rules of mathematics to **solve problems and design new products**.

- Engineers invent new technologies that revolutionize the way we handle information. They design and develop tools, toys, furniture, computers, and almost every other manufactured product that we use. They improve our buildings, roads, and vehicles. They develop systems to clean our water, process our foods, make our fuels burn more efficiently, and recycle our waste.

- Engineering courses enhance creativity, problem solving skills, and understanding of technology.

**TECHNOLOGIST**

- Technologist are the "**doers**." They are workers that are highly trained to perform specific tasks. They:
  - design equipment, processes or systems; interpret and prepare specifications, technical drawings or instructions; prepare estimates and manage projects.
  - specify tests; conduct non-routine tests; develop proto types; operate pilot plants; trouble-shoot complex equipment; resolve production or construction problems; compile experimental data, or prepare reports.
  - supervise, train, coordinate and assume administrative responsibility for the work of others and participate in short and long range planning.

**ENG & ENG TECH SPECTRUM**

- **ABET Accredited ETAC**
- **ENGINEERING TECHNOLOGY EDUCATION**
- **TEST & ANALYSIS**
- **ENGINEERING EDUCATION**
- **ABET Accredited EAC**

www.ump.edu.my
MBOT will enhance the career path of TEVT graduates

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<tbody>
<tr>
<td>8</td>
<td>NA</td>
<td>NA</td>
<td>Doctorate</td>
<td>Principal Technologist / Executive</td>
</tr>
<tr>
<td>7</td>
<td>NA</td>
<td>NA</td>
<td>Masters</td>
<td>Senior Technologist / Executive</td>
</tr>
<tr>
<td>6</td>
<td>NA</td>
<td>NA</td>
<td>Bachelors</td>
<td>Technologist / Executive</td>
</tr>
<tr>
<td>5</td>
<td>Advanced Diploma</td>
<td>Advanced Diploma</td>
<td>Advanced Diploma</td>
<td>Senior Technician</td>
</tr>
<tr>
<td>4</td>
<td>Diploma</td>
<td>Diploma</td>
<td>Diploma</td>
<td>Technician</td>
</tr>
<tr>
<td>3</td>
<td>Skills Certificate 3</td>
<td>Vocational &amp; Technical Certificate</td>
<td></td>
<td>Junior Technician</td>
</tr>
<tr>
<td>2</td>
<td>Skills Certificate 2</td>
<td></td>
<td></td>
<td>Senior Operator</td>
</tr>
<tr>
<td>1</td>
<td>Skills Certificate 1</td>
<td></td>
<td></td>
<td>Operator</td>
</tr>
</tbody>
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A SAMPLE OF A RELATED-INITIATIVE

MTUN AND UMP
Universities’ Role

Outreach Programs for Segments of the Community
a. Socio economy
b. Indigenous Facilities
c. Single mothers

Human Capital Development (High Income)
a. Executive to technical level
b. MyBrain15
c. My3S

Research & Development (Emphasis on Applied Research on Sustainability)
a. Quality – Cost – Delivery
b. Commercialization
c. Knowledge Transfer Programme

Source: Academia-Industry Consultative Council 8th Dec 2011
CoE CENTRE OF EXCELLENCE

VISION
Aspire to be a reputable automotive research centre internationally

MISSION
• To develop innovative automotive technology that contribute to the advancement of industry and community
• To produce outstanding postgraduate in automotive engineering field

OBJECTIVES
• To be recognised as High Impact Center of Excellence (HiCoE) in automotive related researches in 5 years
• To establish networks and undertake research collaboration with local and international research institutions, universities & industries
• To develop professional innovative automotive engineering researchers and engineers with strong integrity

BODY & TDM ENGINEERING
1. Polymer based body parts
   • Sheet Metal body parts
   • Press Stamping Die
   • Plastic Injection Mould

EDUCATIONAL RELATED
2. Bulletin & Journal
   • Apprenticeship for TDM Program
   • Vehicle Component Tear-down Lab for PTP

VEHICLE ENGINEERING & TESTING
3. Component Value Engineering
   • Motor Vehicle Dynamic
   • Alternative Vehicle Power Train
   • NVH & Dynamic Analysis
   • Electric Motor Vehicles
   • Vehicle & Component Testing

FOCUS AREA OF UMP’s AUTOMOTIVE ENGINEERING CENTRE (AEC)

AEC OFFICE

Starting 18th Jun 2012, AEC office has moved to Ground Floor, FKM Administration Building, UMP Pekan Campus.
1. Human Capital Development
   - Industrial Post Graduate – 3 Masters students
   - Apprenticeship program for Under Graduate students-Lean Manufacturing
   - Apprenticeship program for Diploma students

2. Research, Development & Commercialization
   - Design Calculator for OE & RE shock absorber

Source: Academia-Industry Consultative Council 8th Dec 2011
WAYFORWARD

TRANSFORMATION

KNOWLEDGE APPLICATION

EDUCATION  TRAINING  SKILL  FOCUS

Thank You